DOCUMENT RESUME

ED 346 272 CE 061 281

TITLE Precision Machining Technology. Technical Committee Report.
INSTITUTION Idaho State Dept. of Education, Boise. Div. of Vocational Education.
REPORT NO Vo-Ed-136T
PUB DATE 90
NOTE 13p.; For related documents, see CE 061 277-287.
PUB TYPE Guides - Classroom Use - Teaching Guides (For Teacher) (052)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Behavioral Objectives; Competence; Competency Based Education; Industrial Personnel; *Job Analysis; *Job Skills; Machine Repairers; *Machinery Industry; *Machine Tool Operators; Machine Tools; Manufacturing; Occupational Information; Secondary Education; *Trade and Industrial Education; Vocational Education
IDENTIFIERS Idaho

ABSTRACT

This Technical Committee Report prepared by industry representatives in Idaho lists the skills currently necessary for an employee in that state to obtain a job in precision machining technology, retain a job once hired, and advance in that occupational field. (Task lists are grouped according to duty areas generally used in industry settings, and are used as the basis for modules in the statewide curriculum guide development process and for generating student profiles.) The first section of the guide is the task profile, which provides the Idaho code number for the occupation and outlines major concepts/content, laboratory activities, teaching considerations, and intended outcomes. The guide then lists the following 13 task areas with subtasks (competencies) for precision machining technology: employability skills; prerequisite machining skills; bench work skills; power saws; pedestal grinders; drill presses; lathes; milling machines; surface grinding machines; tool and cutter grinding machines; computerized numerical control operations; precision machining technology, functions, and operating principles; and heat treat furnaces. (KC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED346272

Vo.Ed. 136T

TECHNICAL COMMITTEE REPORT FOR

PRECISION MACHINING TECHNOLOGY

Invest in Success

IDAHO VTE VOCATIONAL TECHNICAL EDUCATION

STATE DIVISION OF VOCATIONAL EDUCATION

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

1990

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

T Anderson

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

CE061281

BEST COPY AVAILABLE

Idaho State Board for Vocational Education

Gary G. Fay, President
Twin Falls

Keith Hinckley
Blackfoot

Colleen Mahoney
Lewiston

Roberta L. Fields
New Meadows

M. Karl Shurtliff
Boise

J. Ray Cox
Hayden Lake

Jerry L. Evans
Boise

Trudy Anderson, State Administrator
Division of Vocational Education

It is the official policy of the Division of Vocational Education that no person shall, on the grounds of race, handicap, sex, religion, creed, national origin or age, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program, activity, or employment.

INTRODUCTION

The curriculum development process undertaken by the Idaho Division of Vocational Education involves the active use of industry personnel. Industry personnel comprise the sole membership on Technical Committees which are responsible for the development of Task Lists for each program. A Technical Committee Report is prepared on completion of the Committee's assignment. This publication is the Technical Committee Report.

The Task List prepared in the Technical Committee Report reflect the current trends and skills necessary for an employee to: 1) Obtain a job in Idaho's industry, 2) retain a job once hired, and, 3) to advance in the occupational field. Task Lists are grouped according to Duty areas generally used in industry settings. Duty areas are used as the basis for modules in the Statewide Curriculum Guide development process. The Technical Committee segment is the single most significant step in the curriculum development process. All future curriculum activities are predicated on the premise that an accurate picture of industry needs are reflected in the Task List.

Instructional personnel are selected to develop the Statewide Curriculum Guide. These instructors write Performance Objectives for each Task and the subsequent Enabling Objectives for each Performance Objective. The committee members prepare all material in a competency-based format so as to have an effective and efficient methodology for determining student progress. The Statewide Guides are designed as the prime determiner of program content. All programs must follow the established Guide in order to be approved for operation. Any deviation from this Guide requires written approval from the respective program supervisor at the Division of Vocational Education. It is not the intent of the Division that all programs be designed to be exactly the same, but assurance is needed to ensure that the program meets the minimum standards for operation, based on the community needs, equipment, and facilities available to the local school or institution.

The Technical Committee Report does not dictate the level of instruction The Task List developed represents the entire occupational field. Schools and Institutions determine what skills can be taught and what depth of instruction can be provided. They must choose the Tasks to be taught from the Technical Committee Report but are free to determine how many or which ones can be incorporated into their program.

The Technical Committee Report is also used as the primary list for generating Student Profiles. These Profiles are used as a cumulative record of each student's progress. They are printed in a folder format and have levels of performance scales for each Task so that student competence can be recorded for individual skills or tasks. This document will become the main component for Articulation activities in the event that the student desires to go on for additional training or education.

ACKNOWLEDGEMENTS

The Technical Committee process involves personnel from industry who are selected by the Division with assistance from the State Council on Vocational Education. People who serve on the Committees are nominated by local administrators. They generally come from local advisory committees for existing Vocational Education programs or are community representatives in a capacity to provide the necessary information about industry needs. These people serve with the approval of their employers and give their time and energies to the project without cost. The Division provides reimbursement for per diem and travel. We are indebted greatly to these industry representatives and to their employers for the resources so freely given to the pursuit of ensuring that Idaho students receive the most current training and education possible and that which is demanded by industry.

To this end, the Division recognizes the following people who served on the Machining Technical Committee: Russ Ferguson, Hewlett Packard; Tom O'Brien, Hewlett Packard; Daniel Wenstrom, Precision Machine and Supply; Rogert J. Zweifel, Power Tool & Machine Company, and Paul King, Hewlett Packard.

Your support and assistance was very greatly appreciated. Your patience for enduring the educational process is also noted. The students and instructional staff will be much more able to accomplish their respective goals as a result of your contributions.

Sho Ueda, Supervisor
Trades, Industrial & Technical Education

Don Eshelby
Director of Program Services

TASK PROFILE

CURRICULUM FRAMEWORK **PROGRAM AREA: Trade & Industrial Education**

IDAHO DIVISION OF VOCATIONAL EDUCATION **REVISION DATE: June 1990**

PROGRAM TITLE: Precision Machining Technology

IDAHO CODE NUMBER: 6232 **CIP#: 48.0503**

I. **MAJOR CONCEPTS/CONTENT: The purpose of this program is to prepare students for employment as machinists (600.280-022), filers (705.484-010), grinders (603.280-018), buffers (603.382-010), lay out workers (600.281-018), cut off saw operators (607.682-010), drill press operators (606.682-014), lathe operators (604.280-010), mill operators (605.685-030), C.N.C. machine operators (609.662-010), or to provide supplemental training for persons previously or currently employed in these occupations.**

The content includes, but is not limited to, communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, shop math and blueprints, shaping metal parts to required size, bench work, precision measurement, layout, and inspection.

II. **LABORATORY ACTIVITIES: Machine shop laboratory activities are an integral part of this program and include the set-up and operation of grinders, buffers, cut off saws, drill presses, lathes, milling machines, and machines with computerized numerical controls.**

III. **SPECIAL NOTE: The Vocational Industrial Clubs of America, Inc., (VICA) is an appropriate vocational student organization for providing communications, leadership, human relations, and employability training experiences and for reinforcing specific vocational skills. When provided, these activities are considered an integral part of this program.**

The cooperative method of instruction may be utilized for this program. Whenever the cooperative method is offered, the following is required for each student: a training plan, signed by the student, teacher, and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work station which reflects equipment, skills and tasks relevant to the occupation the student has chosen as a career goal. The student must receive compensation for work performed.

The typical length of the postsecondary program for the average achieving student is 1800 contact hours (2160 clock hours). The recommended length for secondary programs is 900 hours with multi period-blocks of instruction provided to accomplish a major portion of the listed competencies.

IV. **INTENDED OUTCOMES: After successfully completing this program, the student will be able to:**

1. **Demonstrate employability skills and habits.**
2. **Perform prerequisite machining skills.**
3. **Demonstrate proficiency in performing bench work skills.**
4. **Demonstrate proficiency in setting up and operating power saws.**
5. **Demonstrate proficiency in setting up and operating pedestal grinders.**
6. **Demonstrate proficiency in setting up and operating drill presses.**
7. **Demonstrate proficiency in setting up and operating lathes.**
8. **Demonstrate proficiency in setting up and operating milling machines.**
9. **Demonstrate proficiency in setting up and operating surface grinding machines.**
10. **Demonstrate proficiency in setting up and operating tool and cutter grinding machines.**
11. **Demonstrate proficiency in applying computerized numerical control operations skills.**
12. **Describe and identify EDM machine functions and operations.**
13. **Demonstrate proficieney in setting up and operating heat treat furnaces.**

- INSTRUCTIONAL LEVEL CODE -

Ē - Student is introduced to the concept and is familiar with basic operational functions. This level denotes basic instructional content necessary to enter the job market.

R - Student can perform the activity with minimum supervision. This level denotes instructional level necessary to retain a job after obtaining one and working for a short while.

A - Advanced level skills. The student is taught these skills only when the other tasks have been mastered. These are also used for short term training or upgrade training classes.

TASK LISTING

STUDENT PERFORMANCE STANDARDS **EFFECTIVE DATE: June 1990**

PROGRAM AREA: Trade & Industrial Education

PROGRAM TITLE: Precision Machining Technology

01.0 DEMONSTRATE EMPLOYABILITY SKILLS

The student will be able to:

Level		
E	01.01	Identify employment opportunities
	01.02	Apply employment-seeking skills
	01.03	Interpret employment capabilities
	01.04	Demonstrate appropriate work behavior
	01.05	Maintain a business-like image
	01.06	Maintain working relationships with others
	01.07	Communicate on the job
	01.08	Adapt to change
	01.09	Demonstrate a knowledge of business operation

02.0 PERFORM PREREQUISITE MACHINING SKILLS

The student will be able to:

Level		
E	02.01	Demonstrate proficiency in maintaining immediate work area
	02.02	Perform mathematical calculations
	02.03	Demonstrate proficiency in blueprint reading and machine planning
	02.04	Perform measuring operations
	02.05	Perform maintenance on machines and tools

03.0 DEMONSTRATE PROFICIENCY IN PERFORMING BENCH WORK SKILLS

The student will be able to:

Level		
E	03.01	Cut materials by using hand hacksaws
	03.02	Cut threads by using hand taps and dies
	03.03	Ream holes by using hand reamers
	03.04	Hand-sharpen cutting tools by using abrasive stones
	03.05	Hone and lap surfaces
	03.06	Remove damaged screws and other hardware
	03.07	Set up and use arbor press broaches
	03.08	Deburr workpieces
	03.09	Identify and use proper hand finishing tools

04.0 DEMONSTRATE PROFICIENCY IN SETTING UP AND OPERATING POWER SAWS

Level The student will be able to:

04.01 Comply with safe and efficient work practices
04.02 Remove and replace saw blades
04.03 Select appropriate blades to perform given sawing operations
04.04 Select and set speeds and feeds for given sawing operations
04.05 Measure and cut off materials using power saws
04.06 Cut and weld band saw blades to insert for contour sawing
04.07 Set up and operate saws for angular cutting

05.0 DEMONSTRATE PROFICIENCY IN SETTING UP AND OPERATING PEDESTAL GRINDERS - The student will be able to:

Level

05.01 Comply with safe and efficient work practices
05.02 Identify parts of the pedestal grinder
05.03 Mount grinding wheels
05.04 Set up support/tool rests
05.05 Dress grinding wheel
05.06 Grind lathe tools to required angles

06.0 DEMONSTRATE PROFICIENCY IN SETTING UP AND OPERATING DRILL PRESSES

The student will be able to:

Level

06.01 Comply with safe and efficient work practices
06.02 Identify the parts of the drill press
06.03 Lubricate the drill press
06.04 Hand and machine sharpen drills
06.05 Center drill, drill and ream a hole in a workpiece.
06.06 Center-bore, spot-bore and countersink hold in workpiece.
06.07 Hand tap a hold in workpiece.
06.08 Power tap a hold in workpiece.

07.0 DEMONSTRATE PROFICIENCY IN SETTING UP AND OPERATING LATHES

Level The student will be able to:

07.01 Identify the parts of the lathe
07.02 Comply with safe and efficient work practices
07.03 Measure stock
07.04 Set up an engine lathe
07.05 Secure tools, tool-holders and fixtures or attachments
07.06 Select and set feeds and speeds
07.07 Set up lathes and face workpieces held in chucks
07.08 Rough-cut and finish-cut with lathes
07.09 Perform lathe filing to deburr parts

07.10 Align lathe centers using accurate methods
07.11 Drill holes with lathes
07.12 Countersink hole with lathes
07.13 Ream holes with lathes
07.14 Tap threads with lathes
07.15 Die-cut threads with lathes
07.16 Counterbore holes with lathes
07.17 Bore holes with lathes
07.18 Knurl parts with lathes
07.19 Cut external threads with lathes
07.20 Re-chase threads with lathes
07.21 Cut internal threads with lathes
07.22 Set up and perform taper turning with taper attachments
07.23 Set up and perform taper turning with compound
07.24 Cut internal tapered surfaces
07.25 Set up and operate tool post grinders
07.26 Perform contour, angular or radial cuts with lathes
07.27 Set up and use follow and steady-rests
07.28 Set up face plates and dogs

08.0 DEMONSTRATE PROFICIENCY IN SETTING UP AND OPERATING MILLING MACHINES - The student will be able to:

Level
08.01 Identify the parts of the horizontal and vertical milling machine
08.02 Lubricate milling machines.
08.03 True up the head and align milling machines fixtures
08.04 Select and set feeds and speeds for milling work
08.05 Square up workpieces with a table vise
08.06 Perform end milling
08.07 Perform fly-cutting operations
08.08 Drill holes with a milling machine
08.09 Perform reaming operations
08.10 Cut external keyways
08.11 Bore holes with milling machines
08.12 Perform form milling
08.13 Perform indexing operations using a dividing head
08.14 Set up and operate rotary tables
08.15 Mill cylindrical work
08.16 Mill an external radius
08.17 Mill an angle
08.18 Align milling machine attachments
08.19 Mill internal slots with a slotter and attachment
08.20 Perform cutting-off operations
08.21 Set up and perform slab mill operations
08.22 Use an edge finder and wiggler
08.23 Use digital readouts
A 08.24 Perform straddle milling operations on the horizontal mill
A 08.25 Set up and use a sine vise

09.0 DEMONSTRATE PROFICIENCY IN SETTING UP AND OPERATING SURFACE GRINDING MACHINES - The student will be able to:

Level		
	09.01	Identify the parts of the machine
	09.02	Comply with safe and efficient work practices
	09.03	Clean and lubricate surface grinding machine
	09.04	Select the proper wheel
	09.05	Inspect, balance, dress, and true grinding wheels
	09.06	Attach and align workpieces for grinding operations
	09.07	Select and set feeds and speeds of grinders
	09.08	Set up and grind parallel flat surfaces
	09.09	Set up and grind four sides square
	09.10	Set up and use angle plates
A	09.11	Cut off or part workpieces with grinding machines
A	09.12	Set up grinders to run workpieces between centers
A	09.13	Measure, inspect, and rework workpieces on grinding machines
A	09.14	Set up, grind, and sharpen preshaped lathe tools
A	09.15	Set up and use radius dressers

10.0 DEMONSTRATE PROFICIENCY IN SETTING UP AND OPERATING TOOL AND CUTTER GRINDING MACHINE - The student will be able to:

Level		
	10.01	Identify the parts of the machine
	10.02	Comply with safe and efficient work practices
	10.03	Identify and select proper machine controls
	10.04	Select proper wheels and work holding devices
	10.05	Perform truing, dressing, and forming operations to blueprint specifications
	10.06	Compute proper speeds
	10.07	Sharpen an end mill
	10.08	Sharpen a horizontal milling cutter
	10.09	Sharpen drills and countersinks

11.0 DEMONSTRATE PROFICIENCY IN APPLYING COMPUTERIZED NUMERICAL CONTROL OPERATIONS - The student will be able to:

Level		
A	11.01	Identify the parts of the machine
	11.02	Comply with safe and efficient work practices
	11.03	Identify and select proper machine controls
	11.04	Write a program and apply basic programming skills to a turning and/or a milling operation
	11.05	Select proper work holders
	11.06	Select proper cutting tools
	11.07	Machine parts to blueprint tolerances
	11.08	Demonstrate the use of CAD/CAM system for part program development

12.0 **DESCRIBE EDM MACHINE, AND OTHER NEW PRECISION MACHINING TECHNOLOGY, FUNCTIONS AND OPERATING PRINCIPLES**

The student will be able to:

Level		
A	12.01	**Describe the parts of the EDM machine**
	12.02	**Describe EDM machine controls**
	12.03	**Describe the functions of laser technology in precision machining**
	12.04	**Describe the functions of robotics in precision machining**

13.0 **DEMONSTRATE PROFICIENCY IN SETTING UP AND OPERATING HEAT TREAT FURNACES - The student will be able to:**

Level		
A	13.01	**Comply with safe and efficient work practices**
	13.02	**Identify proper machine controls**
	13.03	**Select proper heat treatment processes**
	13.04	**Perform a basic heat treatment process to blueprint specifications**
	13.05	**Define stress relieving, annealing and normalizing**

IDAHO
VTE
VOCATIONAL TECHNICAL EDUCATION